Listing of Claims:

1. (Cancelled)

2. (Previously Presented) A method of sensing the presence of an analyte component in an analyte with a sensor including (i) a plurality of polymer strands each having at least a first end and a second end and each aligned in a non random orientation, (ii) a plurality of molecular recognition headgroups having an affinity for said analyte component, being attached to said first ends of said polymer strands, and participating in a redox reaction when contacting a molecule of said analyte component, and (iii) an electrode substrate attached to said polymer strands at said second ends, the method comprising:

contacting said molecular recognition headgroups with said analyte; and

detecting an electrical signal at the electrode substrate resulting from mobile charge carriers generated by said redox reaction and transferred by said polymer strands to said electrode substrate to thereby sense the presence of the analyte component, wherein when said redox reaction occurs at a headgroup, a mobile charge carrier is transferred directly to a polymer strand attached to said headgroup, and wherein the analyte comprises a second component that changes conductivity of the polymer strands and thereby affects the electrical signal.

3. (Previously Presented) The method of claim 2, further comprising:

monitoring a change in an electronic circuit connected to said electrode substrate, said change resulting from reception of mobile charge carriers from said polymer strands; and

correlating said change in said electronic circuit with a concentration of the analyte component.

4. (Previously Presented) The method of claim 2, wherein the polymer strands have a native form that is an insulator but upon contact with the second component they become conductive.

5. (Previously Presented) The method of claim 2, wherein the polymer strands reversibly switch from conductive to insulative states based on the presence of the second component.

6. (Previously Presented) The method claim 2, wherein the polymer strands are polymerized from a monomer selected from the group consisting of N-methylpyrrole, thiophene, 3-methylthiophene, 3,4-dimethylthiophene, vinylferrocene, styrene, nitrostyrene, viologens, vinyl-pyridine, vinyl-2,2'-bipyridine, vinylrubrene, quinone-based compounds, and derivatives thereof.

7. (Previously Presented) The method of claim 2, wherein the polymer strands comprise polythiophene derivatives and wherein the second component is at least one of potassium ions and sodium ions.

8. (Previously Presented) The method of claim 2, wherein the second component causes a pH change in the analyte, which affects the conductivity of the polymer strands.

9. (Previously Presented) The method of claim 2, wherein the plurality of polymer strands are multi-stranded nucleic acid strands.

10. (Previously Presented) The method of claim 2, wherein the plurality of polymer strands are double-stranded DNA strands.

11. (Previously Presented) The method of claim 2, wherein the polymer strands comprise a sequence-specific nucleic acid stand and the second component comprises a complementary nucleic acid sequence, whereby a conductive double stranded nucleic acid polymer strand results from hybridization of the second component and the sequence-specific nucleic acid strand.